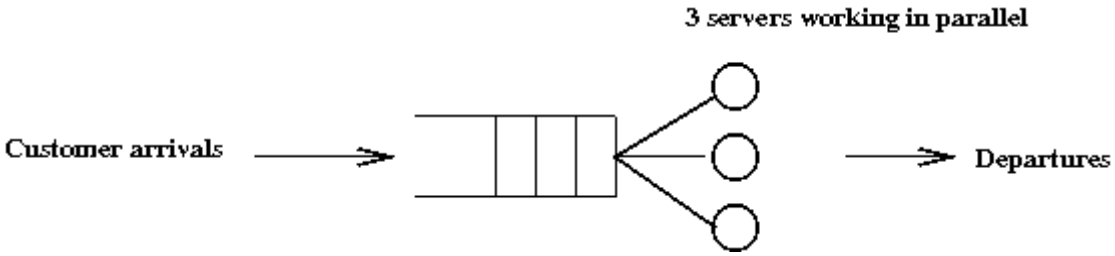
Assignment 4

In this assignment you will explore a simple variation of the single-server queue: when there are two or more servers instead of a single server.



In this system, customers arrive as usual from the outside. Now there are *K* servers available instead of one. A customer can go to any of the *K* servers for service. Thus, all *K* of them have to be busy serving for a customer to need to wait.

For this assignment:

- Use the simulation of a single-server queue covered in class as a starting point.
- Write code for general *K*, and make a *K* a variable.
- Assume the service time is the same at all the servers, and that each service time is exponentially distributed with mean *1.0*.
- For the case *K=2*, plot the system time vs. increasing arrival rate λ.
- What is the value of the system time when $\lambda=1.5$?
- What value of λ would cause the queue to become unstable?
- What value of λ would cause the queue to become unstable when *K=3*?
- What did you do to assess the accuracy of your estimates?
- Write down two applications of the above queueing model?

Submission:

- Put all your code for this assignment in a single directory so that your code unpacks into that directory. Embed your username in the directory name.
- Write all your code in a file called `ThreeServerQueue.java`.
- Note: there is no animation required. Your program should compile and execute at the command-line, printing aggregate results to the terminal.
- Your directory should contain answers to the questions, and the plot (as a JPEG, GIF or PNG).
- Include a plain-text README file that tells us how to run your code.
- Include the PDF scan of your "key distributions" (Bernoulli etc) exercise with this zip.
- Upload your zip file into Blackboard.
- Name your zip file `karel4.zip` (for username `karel`).